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Date 12 / 10 / **2001**

Serial Number of Application 09/915,132

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US-PAT-NO: 5938087
DOCUMENT-IDENTIFIER: US 5938087 A

TITLE: Spurt minimizing dispensing structure

DATE-ISSUED: August 17, 1999

INVENTOR-INFORMATION:

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US-CL-ISSUED: 222/547; 222/556, 222/568, 222/571
US-CL-CURRENT: 222/547; 222/556, 222/568, 222/571

FIELD-OF-SEARCH: 222/547, 222/556, 222/568, 222/571

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL

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ART-UNIT: 371

PRIMARY-EXAMINER: Jacyna; J. Casimer

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ABSTRACT:

A spurt-resistant spout for a dispensing structure includes (1) an internal tubular portion having a through bore connecting a dispensing orifice of the spout with the interior of the container, and (2) a surrounding wall portion surrounding the tubular portion. The tubular portion and the surrounding wall portion are sized and located so that little or no fluid is retained in and across the spout bore so as to prevent, or minimize, obstruction of the bore.

26 Claims, 5 Drawing figures
Exemplary Claim Number: 1
Number of Drawing Sheets: 2

BRIEF SUMMARY:

CROSS REFERENCE TO RELATED APPLICATION(S)

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

REFERENCE TO A MICROFICHE APPENDIX

Not applicable.

TECHNICAL FIELD

This invention relates to a system for dispensing a product from a container. The invention is especially suitable for a dispensing structure for dispensing high viscosity fluids from a dispensing orifice normally closed by a lid.

BACKGROUND OF THE INVENTION AND TECHNICAL PROBLEMS POSED BY THE PRIOR ART

A variety of packages that include dispensing systems on containers have been developed for household products such as shampoos, lotions, food products and other substances. Such containers typically have a neck defining an open upper end on which is mounted a dispensing closure. The dispensing closure for these kinds of containers typically has a dispensing spout which is covered with a removable lid.

The closure typically has a closure deck or top wall and a depending skirt with an inside bead or thread for attachment to a container. The closure deck includes a dispensing orifice through which a fluid can be dispensed. Depending on the surface tension of the fluid being dispensed through the closure orifice and the coefficient of friction between the fluid and the closure, the fluid tends to cling to the underside of the closure deck and form a layer beneath the dispensing orifice after a dispensing operation. The resulting layer of fluid has a thickness generally dependent on the fluid viscosity.

The lid is typically reclosed to cover the orifice. When the lid is subsequently removed quickly from the closure deck prior to a dispensing operation, the outward movement of the lid has a tendency to immediately cause the fluid in the layer to "spurt", "burp" or otherwise be propelled out of the orifice prior to a controlled, intentional dispensing. The burping of the fluid can cause spatter on the user's hand or clothing or dripping on an exterior surface of the container.

It would be desirable to provide an improved dispensing structure wherein a dispensing orifice in a deck is normally closed by a closure lid which is openable away from a closure deck and wherein the dispensing structure is resistant to propelling fluid upon separation of the lid from the deck.

In addition, it is desirable that the improved dispensing structure design function well with a wide range of fluids, including high viscosity liquids and low viscosity liquids. It would also be beneficial if such an improved dispensing structure design could function well with fluids having different surface tension characteristics.

The present invention provides an improved dispensing structure which can accommodate designs having the above-discussed benefits and features.

SUMMARY OF THE INVENTION

According to one aspect of the present invention, a dispensing structure is provided for a squeezable, fluid holding container so as to eliminate or minimize the propelling or spurting of fluid from a discharge orifice of the dispensing structure during removal or disengagement of a lid which normally closes the discharge orifice. The structure includes a body for closing an opening of the container. The body includes a closure deck having a discharge orifice ordinarily closed by a removable lid. Within the body, and extending from the closure deck, is (1) a conduit,such as a tube, surrounding the orifice and forming a flow channel or passage into the orifice, and (2) a surrounding wall structure, such as an outer ring, around the conduit.

In one embodiment, the surrounding wall structure extends deeper into the container than does the conduit, i.e., the conduit extends to a free end which is recessed upwardly from a free end of the surrounding wall structure.

The surrounding wall structure controls the formation of a "meniscus" of a layer of fluid formed within the discharge structure. The "meniscus" is understood to be a convex or concave surface of a column or layer of liquid. The conduit is sized to extend just beyond the meniscus in order to pierce through the layer of fluid, creating an air path from the interior of the container to the exterior of the

container. The conduit acts to break the fluid layer that might otherwise form behind the orifice, thus relieving any pressure behind the layer that would tend to cause the product to "burp" or spurt when the lid is quickly opened. The passage within the conduit is sized such that the surface tension of the fluid resists flow into the conduit. Thus, flow into the conduit will only occur when positive pressure is applied to the contents of the container. Reduced interior pressure (i.e., partial vacuum) created by the container panels returning to their normal position after being squeezed, clears the conduit of fluid.

The diameter and height of the surrounding wall structure and the conduit can vary depending on the fluid and the environment. For example, larger diameters and less height differential are anticipated to be advantageous for more viscous fluids than less viscous, thinner fluids due to the shape and size of the formed meniscus.

The surrounding wall structure can be provided in the form of a ring member extending downwardly from the closure deck or can be formed as a part of the surrounding containment wall of the dispensing structure or container.

In another embodiment, the conduit extends into the dispensing structure as far inwardly as the inner end of the surrounding wall.

In both embodiments, the surrounding wall structure serves to encourage a meniscus to form around the conduit so as to minimize or prevent fluid accumulation in the conduit. The surrounding wall structure allows residual fluid to drip down the surrounding wall structure away from the conduit so as to minimize the tendency of the fluid to enter the conduit.

According to the invention, the dispensing structure can include a lid which may be hinged to, tethered to, or completely removable from, the body of the structure.

The dispensing structure of the present invention may be formed as a unitary part of the container. Alternatively, the dispensing structure may be formed as a separate piece which can be subsequently mounted to the container. Such a dispensing structure in the form of a closure can be designed for attachment to the top of the container by means of a threaded engagement or snap-on engagement.

Numerous other advantages and features of the present invention will become readily apparent from the following detailed description of the invention, from the claims, and from the accompanying drawings.

DRAWING DESCRIPTION:

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings forming part of the specification, in which like numerals are employed to designate like parts throughout the same,

FIG. 1 is a front perspective view of a first embodiment of the dispensing structure of the present invention shown with the lid open;

FIG. 2 is a cross-sectional view taken generally along plane 2--2 of FIG. 1;

FIG. 3 is a fragmentary, cross-sectional view similar to FIG. 2, but FIG. 3 shows an amount of fluid within the dispensing structure;

FIG. 3A is a fragmentary, cross-sectional view of an alternate embodiment dispensing structure;

FIG. 4 is a fragmentary, cross-sectional view of an alternate embodiment of the dispensing structure, and FIG. 4 shows the dispensing structure mounted on a container.

DETAILED DESCRIPTION:

DESCRIPTION OF THE PREFERRED EMBODIMENT